Wastewater: A Threat to the Environment Vs Resource Recovery

Abstract

Wastewater, a by-product of human activities is a pressing environmental hazard due to its diverse pollutants. The past decades have seen a significant increase in the intensity of wastewater strengths. Contaminants such as nutrients, pathogens, heavy metals, and organic compounds sourced from agriculture, households, and industries greatly threaten the ecosystem and public health. It is no exaggeration that untreated wastewater dumped in water bodies can pollute exponential quantities of fresh water. This inappropriate disposal into water bodies contributes to water pollution, disrupts aquatic ecosystems, degrades soil quality, and compromises groundwaters. The imbalances in aquatic environments, causing algal blooms, oxygen depletion, and the creation of dead zones observed in the rivers, are due to the discharge of untreated wastewater into water bodies. The built-up concentrations can potentially raise waterborne diseases affecting public health, particularly in the areas lacking sanitation infrastructure. However, the wastewater holds great potential as a resource. By reclaiming the wastewater by adopting advanced treatment technologies, the water can be used for industrial and agricultural purposes. Additionally, can also be used for domestic purposes. Adopting anaerobic processes exhibited the potential of producing methane-rich biogas, which can be used as a fuel source, and that could reduce the discharge of greenhouse gases into the environment. The current thrive of green hydrogen energy can use the wastewater for electrolysis rather than fresh water. Posing a great hazard to the environment, wastewater on proper management can be a solution for addressing water scarcity and achieving energy sustainability.

Brief Bio: Dr. Narasamma Nippatlapalli

Dr. Narasamma Nippatlapalli, currently working as an Assistant Professor in the Department of Civil and Environmental Engineering (Environmental Engineering division) at Indian Institute of Technology Tirupati. Before joining IIT Tirupati, she was an Assistant Professor at the Indian Institute of Technology Dharwad in the Department of Civil and Infrastructure Engineering. She obtained her Bachelor's degree from Sri Venkateswara University (SVU) Tirupati (Civil Engineering Department). Next, she pursued M Tech from NIT Warangal, Department of Civil Engineering. She conducted her MTech thesis work at the Hyderabad Metropolitan Water Supply and Sewerage Board (HMWSSB) on the Characterization of Municipal Wastewater and Biogas quantification. Dr. Nippatlapalli completed her PhD at IIT Madras. Her research mainly focused on the design of reactors, and degradation of emerging contaminants, per/polyfluorinated (PFAS) compounds, and textile wastewater, pharmaceutical wastewater. She was a postdoctoral fellow at Florida State University (FSU) in the USA.

Awards received

- **Institute Best Research Award** 2021, IIT Madras
- **Bhagyalakshmi and Krishna Iyengar Award 2021**, Best PhD Research in 64th Convocation, IIT Madras, 2021.
- **AWSAR Award** from the **Government of India** for proposing a complete solution for **"Colored textile wastewater treatment"**
- Women Leading IIT Madras, **Promising Young Researcher Award**, IIT Madras, 2021